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EXAMINER
RAO, SHRINIVAS H

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/932,029	Applicant(s) MATSUMOTO, KIMIKAZU	
	Examiner Steven H. Rao	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Amendment

Applicants' amendment filed on April 16, 2003 has been entered On April 22, 2003.

Therefore claims 1,3,5,10, 12, 14 1,9, 21 and 23 as amended by the amendment and claims 2,4,6-9,11,13,15-18,20 and 22 as originally filed are currently pending in the Application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 to 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPR (Applicants' Admitted Prior Art, e.g. figs. 1-2 and specification pages at least 3 to 5) and Yamakita et al. (U.S. Published Patent Application No. 2002/0154262, herein after Yamakita).

With respect to claim1, AAPR describes an in-plane switching type liquid crystal display unit including: a pair of substrate structures (AAPR figs. 300 and 400) having at least plural pixel electrodes (AAPR fig. 1 # 58, specification page 3 line 5 from bottom) and a common electrode on one of the substrate structures thereof (AAPR fig. 1 # 53) and a liquid crystal layer sandwiched between said substrate structures (fig.1 # 70).

AAPR does not specifically describe its liquid crystal layer having a splay elastic coefficient falling within a range expressed as 6 Pico Newton < said first electric

coefficient < 25 Pico Newton. (i.e. between 6 and 25 pico-newtons) for improving a luminance of said in-plane switching type liquid crystal display unit.

However, Yamakita, in pages 11- 10 right hand column first three lines and last three lines describes liquid crystal layers with Spray elastic constant to be 9 and 12 pN in the overlapping range of 6 to 25 pN for improving a luminance of said in-plane switching type liquid crystal display unit. (Yamakita col. 2 section 0025 lines 3-4, col. 8 sections 0021,0022 and 0133) to form a transparent electrode which allows the portions of the light located right above the electrodes to be used as a display portion, thus improving the transmittance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Yamakita's liquid crystal layers having a Spray elastic constant to be 9 and 12 pN In AAPR's device one of ordinary skill in the art would be motivated to make the above substitution to form a transparent electrode which allows the portions of the light located right above the electrodes to be used as a display portion, thus improving the transmittance (Yamakita page 2 last four lines).

With respect to claim 2, wherein the liquid crystal of said crystal layer has a positive anisotropy of dielectric constant. (Yamakita page 11 line 2).

With respect to claim 3, wherein the liquid crystal further has a bend elastic coefficient and a twist elastic coefficient and said splay elastic coefficient, said splay elastic coefficient and said bend elastic coefficient and said twist elastic coefficient satisfy an inequality expressed as $0.5 < ((K_{11} \times K_{33})/K_{22}) < 2.0$", where K_{11} is said first

elastic coefficient , K_{33} is said bend elastic coefficient and K_{22} is said twist coefficient . (Yamakita page 10 last line and page 11 first three lines).

With respect to claim 4, wherein the substrate structures are spaced from each other by a distance ranging from 1.0 micron to 6.0 microns. (Yamakita page 7 right hand col. Last 12 lines)

With respect to claim 5, wherein an electric field is created between each of said plural pixel electrode and a part of said common electrode under application of a potential difference there between and each of said plural pixel electrode is spaced from and said part of said common electrode in a direction parallel to inner surfaces of said substrate structures by a distance ranging from 2 microns to 15 microns. (Yamakita page 7 right hand col. Last 15 lines).

With respect to claim 6, wherein said substrate structures are spaced from each other by a first distance ranging from 1.0 micron to 6.0 micron, and each of said plural pixel electrodes and an associated part of said common electrode is spaced from each other in a direction parallel to inner surfaces of said substrate structures by a second distance ranging from 2 microns to 15 microns. (Yamakita page 8 last 12 lines).

With respect to claim 7, wherein the plural pixel electrodes parts of said common electrode respectively associated with said plural pixel electrode and pieces of said liquid crystal layer respectively overlapped with combinations of said plural pixel electrodes and said parts from in combination plural pixels arranged in a matrix. (Yamakita fig. 5, page 8 , right hand col., lines 7 to 24).

With respect to claim 8, wherein the color filters selectively put in the primary three colors and contained in the plural pixels respectively. (Yamakita page 9, right hand col. Section [0141]).

With respect to claim 9, wherein the plural pixel electrodes and said common electrode are formed on said one of said substrate structures together with data lines and thin film transistors selectively connected between said data lines and said pixel electrodes and said color filters are formed on the other of said substrate structures together with a black matrix. (Yamakita fig. 17 a etc.).

With respect to claim 10, describes a pair of substrate structures having at least plural pixel electrodes (AAPR figs. 300 and 400) and a common electrode on one of the substrate structures thereof, (AAPR fig. 1 # 58, specification page 3 line 5 from bottom) and a liquid crystal layer(AAPR fig. 1 # 53) sandwiched between said substrate structures (fig.1 # 70)

AAPR does not specifically describe its liquid crystal layer having a bend elastic coefficient concerning a deformation like a bent line to fall within the range expressed as 5 Pico Newton < said bend electric coefficient < 20 Pico Newton. (i.e. between 5 and 20 pico-newtons) for improving a luminance of said in-plane switching type liquid crystal display unit.

However, Yamakita, in pages 11- 10 right hand column first three lines and last three lines describes liquid crystal layers with Spray elastic constant to be 18 pN in the overlapping range of 5 to 20 pN for improving a luminance of said in-plane switching type liquid crystal display unit (Yamakita col. 2 section 0025 lines 3-4, col. 8 sections

0021,0022 and 0133) to form a transparent electrode which allows the portions of the light located right above the electrodes to be used as a display portion, thus improving the transmittance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Yamakita's liquid crystal layers having a bent elastic constant to be 18 pN In AAPR's device one of ordinary skill in the art would be motivated to make the above substitution to form a transparent electrode which allows the portions of the light located right above the electrodes to be used as a display portion, thus improving the transmittance (Yamakita page 2 last four lines).

With respect to claims 11 to 18 repeat the steps of claims 2 to 9 and are rejected for reasons stated under claims 2 to 8 above.

With respect to claim 19, describes an in-plane switching type liquid crystal display unit including a pair of substrate structures (AAPR figs. 300 and 400) having at least plural pixel electrodes and a common electrode on one of the substrate structures thereof (AAPR fig. 1 # 58, specification page 3 line 5 from bottom) and a liquid crystal layer (AAPR fig. 1 # 53) sandwiched between said substrate structures (fig.1 # 70)

AAPR does not specifically describe its liquid crystal layer having a first elastic coefficient concerning a deformation like splay .

However, Yamakita, in pages 11- 10 right hand column first three lines and last three lines describes liquid crystal layers with Splay elastic constant to form a transparent electrode which allows the portions of the light located right above the electrodes to be used as a display portion, thus improving the transmittance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Yamakita's liquid crystal layers having a Splay elastic constant in AAPR's device one of ordinary skill in the art would be motivated to make the above substitution to form a transparent electrode which allows the portions of the light located right above the electrodes to be used as a display portion, thus improving the transmittance (Yamakita page 2 last four lines). The other limitations of claim 19 are : and a bend elastic coefficient concerning a deformation like a bent in, (Yamakita page 10 line1) the square root of the product between the splay elastic coefficient and said bend elastic coefficient being fallen within the near expressed as 5 Pico Newton < SQRT< 20 Pico Newton where SQRT is said square root of the product between said splay elastic coefficient and said bend elastic coefficient. (Yamakita page 10 right hand col. Last 3 lines to left hand col. First two lines) for improving a luminance of said in-plane switching type liquid crystal display unit (Yamakita col. 2 section 0025 lines 3-4, col. 8 sections 0021,0022 and 0133) .

With respect to claims 20 to 27 repeat the steps of claims 2 to 9 and are rejected for reasons stated under claims 2 to 9 above.

Response to Arguments

Applicant's arguments filed 4/22/03 have been fully considered but they are not persuasive for the following reasons :

Applicants' first contention that Yamakita is directed only to improving the response sped is not persuasive because Yamakita at least in sections 0025, 0121, 0122 and 0133 states :

> a high speed response, and a high image quality such as high luminance without changing a liquid crystal material, reducing cell gap, or increasing a drive voltage, and a fabrication method thereof.
>
> 1500 A. Therefore, to realize improvement of transmittance and high-speed response, the film thickness is preferably set to 1500 Å or larger.
>
> higher speed response is possible. It should be remembered that the film thickness needs to be optimized according to the relationship of tradeoff with reduction of an optical characteristic such as transmittance and light diffusing value due to the increased film thickness.
>
> display regions. Accordingly, the transmittance can be
>
> improved. The electric field strength between the electrodes

Therefore Yamakita is also directed to the problem of high luminance.

Applicants' second contention that Yamakita does not teach any relationship between the use of any liquid crystal material and the ability to use a transparent electrode is not persuasive because in section 0133 states :

> region S2 of FIG. 6(*b*). In this case, since transparent electrodes are used as the electrodes of the present invention, the regions over the electrodes can be used as liquid crystal display regions. Accordingly, the transmittance can be

Therefore Yamakita clearly describes the relationship between the use of any liquid crystal material and the ability to use a transparent electrode.

Applicants' next contention that Yamakita does not teach " reducing the affect on luminance by restricting the splay elastic coefficient or the bend coefficient for the liquid crystals is not persuasive because Yamakita in section 0158 states

> difference Δnd is approximately 350 nm. Spray elastic constant of the liquid crystal material of the liquid crystal layer 2 is k11=12(pN), twist elastic constant is k22=7(pN), bend
>
> elastic constant is K33=18 (pN), and dielectric constant anisotropy is Δε=+8. The dielectric constant anisotropy Δε and the bend elastic constant K33 are important factors in determination of the drive voltage of the liquid crystal. It is particularly preferable that the dielectric constant anisotropy Δε is +8 or more and the bend elastic constant K33 is 18(pN) or less.

Therefore Yamakita clearly describes reducing the affect on luminance by restricting the splay elastic coefficient or the bend coefficient for the liquid crystals.

Therefore none of the Applicants' contentions are persuasive

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (703) 306-5984. The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 5:30 p.m.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7724.

Steven H. Rao

Patent Examiner

June 16, 2003.

SUPERVISORY PRIMARY EXAMINER
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